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**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

FEDERAL COMMUNICATIONS COMMISSION  
WASHINGTON, D.C. 20541

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**In the Matter of**

## Telephone Company-Cable Television Cross-Ownership Rules, Section 63.54-63.58

and

# Amendments of Parts 32, 36, 61, 64, and 69 of the Commission's Rules to Establish and Implement Regulatory Procedures for Video Dialtone Service

CC Docket No. 87-266

**RM-8221**

**Comments of BroadBand Technologies, Inc., on  
The Third Further Notice of Proposed Rulemaking**

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## SUMMARY

With these comments BroadBand Technologies responds to the Federal Communications Commission ("FCC" or "Commission") Third Further Notice in the video dialtone proceeding on issues of price and availability of digital video platforms. BroadBand Technologies' role in the development of integrated digital broadband networks is that it supplies the electronics hardware and software that switches and transmits voice, data and video technology over fiber optic lines to the curb. BroadBand Technologies' vision has made the technology both affordable and available much sooner than pundits predicted.

In the *Notice*, the Commission rightfully questions the ability of analog systems to successfully meet its public policy goals of "facilitating competition in the provision of video services; promoting efficient investment in the national telecommunications infrastructure; and fostering the availability to the American public of new and diverse sources of video programming."<sup>1/</sup> However, the Commission also questions whether telephone companies can deploy digital video platforms in a reasonable time frame and at reasonable cost. BroadBand Technologies demonstrates in its comments that such platforms are technically and economically viable in the short term.

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<sup>1/</sup> *In the Matter of Telephone Company Cable Television Cross-Ownership Rules, Sections 63.54-63-58, Memorandum Opinion and Order on Reconsideration and Third Further Notice of Proposed Rulemaking*, CC Docket No. 87-266, rel. Nov. 7, 1994, para. 3. In these comments, we refer to the Memorandum Opinion and Order as the "Reconsideration Order" and the Third Further Notice of Proposed Rulemaking as the "Notice."

The technological and regulatory benefits of telephone companies deploying digital video platforms are substantial. Even though deployment of digital video platforms is just beginning, such platforms offer advantages over analog systems, including full interactivity, the capacity to support a wide range of applications, less costly and complex interconnection capabilities, and the ability to expand as demand for capacity increases. In contrast, LECs that today opt to deploy video platforms based on analog technologies may argue in the future that it would not be economically reasonable for them to incur the costs of expanding the capacity of such networks, thus thwarting the goals of the Commission's video dialtone policy.

Switched digital broadband systems are currently available at a reasonable price. From direct experience as a manufacturer of digital video transport systems, BroadBand Technologies can assure the Commission that cost-effective digital transmission technologies are available today for use by LECs in providing video dialtone service. Several companies, including Bell Atlantic, U S WEST, and AT&T, have announced their intention to deploy or support such systems. BroadBand Technologies' fully digital first-generation FLX platform, a "cutting edge" technology according to the Commission, is already being deployed. Moreover, consistent with the general trend in digital technologies, the capacity of the FLX system vastly exceeds that of analog transport systems, system cost has fallen and continues to fall, and capacity and deployment efficiency will increase in the next generation product line, due to be released in late 1995.

BroadBand Technologies' system and others like it ensure equal access for multiple video programmers, thus eliminating the need for cumbersome channel sharing or channel allocation schemes that may be inconsistent with the common carrier nature of video dialtone service. No programmer is disadvantaged relative to other programmers. Such systems allow for substantial control over the network by both the content provider and the subscriber. Furthermore, deploying such systems also allows the use of less complex, and therefore less expensive, digital set-top converters.

With regard to other components of a full digital video platform, based on its close involvement with companies developing digital set-tops, as well as video servers and encoders, BroadBand Technologies also is convinced that these other components are now, or soon will be, available at reasonable prices.

Based on evidence presented in the following comments, BroadBand Technologies urges the Commission to act to promote the use of all-digital systems. As the Commission states, it is "not technology-neutral with respect to technologies that cannot meet" the core requirements of its video dialtone rules. In contrast to analog and mixed analog/digital video dialtone platforms, all-digital systems are fully consistent with these rules. The Commission has several options available to it:

- As stated in the *Notice*, the Commission could "require [local exchange carriers] to employ all-digital video dialtone systems."<sup>2/</sup> The imposition of such a requirement

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<sup>2/</sup> *Notice*, para. 270.

would be within the Commission's statutory authority and would be fully consistent with past Commission actions in similar circumstances.

- The Commission could require a transition to digital video systems over a specified period of time.
- The Commission could expedite approval of pending Section 214 video dialtone applications that meet its equal access, capacity, and expandability requirements for video dialtone systems. This would send clear signals to the telephone companies that the Commission prefers such systems.

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- APPENDIX E      *Interactive TV Leaders Cooperate to Deliver Video-on-Demand Services*, news release, April 20, 1994.

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Comments of BroadBand Technologies, Inc. on  
The Third Further Notice of Proposed Rulemaking



## I. Introduction

BroadBand Technologies respectfully submits these comments to the Third Further Notice of Proposed Rulemaking in the video dialtone proceeding.<sup>1/</sup> BroadBand Technologies was founded in 1988 on the conviction that integrated switched digital broadband networks would emerge as the optimal access network technology for delivering voice, video, data, and interactive services on an open access basis to all consumers and from multiple service providers. We believe that the Federal Communications Commission ("FCC" or "Commission") actions in this proceeding go far in making such networks a reality.

BroadBand Technologies' role in the development of integrated digital broadband networks is that it supplies the electronics hardware and software that switches and transmits voice, data and video technology over fiber optic lines to the curb. When we began, conventional wisdom was that such technology would be affordable only for large businesses and institutions. In addition, most experts agreed that the technology would not become available until the second half of the 1990s. BroadBand Technologies believed we could make the technology both affordable and available much sooner. And, in fact, we introduced a switched digital video platform in trials in July 1991, only three years after the company's inception. Indeed, Bell Atlantic - New Jersey is deploying BroadBand Technologies' system in Dover Township, N.J., the only commercial video dialtone system the Commission has

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<sup>1/</sup> *In the Matter of Telephone Company Cable Television Cross-Ownership Rules, Sections 63.54-63-58, Memorandum Opinion and Order on Reconsideration and Third Further Notice of Proposed Rulemaking, CC Docket No. 87-266, rel. Nov. 7, 1994. In these comments, we refer to the Memorandum Opinion and Order as the "Reconsideration Order" and the Third Further Notice of Proposed Rulemaking as the "Notice."*

approved to date. In its Order approving the Dover Township application, the Commission referred to BroadBand Technologies' system as standing "at the cutting edge of technology."<sup>2/</sup>

In the *Reconsideration Order*, the Commission reaffirmed its goals with regard to video dialtone of "facilitating competition in the provision of video services; promoting efficient investment in the national telecommunications infrastructure; and fostering the availability to the American public of new and diverse sources of video programming."<sup>3/</sup> However, in the *Notice*, the Commission rightfully questions the ability of analog systems to successfully meet these goals and notes that "[t]o the extent that digital transmission facilities can be used instead to deliver the same programming, capacity constraints are substantially mitigated."<sup>4/</sup> However, the Commission has also raised questions as to the cost and availability of digital video technologies. In particular, it has questioned whether digital compression and transmission equipment are widely available.<sup>5/</sup>

BroadBand Technologies believes not only that there are compelling reasons for the Commission to encourage the deployment of digital technologies, but that these technologies either are now or will be available shortly at reasonable prices. In the comments that follow

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<sup>2/</sup> *New Jersey Bell Telephone Company*, W-P-C-6840, Order and Authorization, 9 FCC Rcd 3677, 3688 (1994), recon. pending ("Dover Township").

<sup>3/</sup> *Notice*, para. 3.

<sup>4/</sup> *Notice*, para. 268.

<sup>5/</sup> *Id.*

we outline the technological and regulatory benefits of telephone companies deploying digital video platforms and examine the issues of availability and price for the components of such systems.

## II. Digital Technologies Are Rapidly Replacing Analog Technologies

The development of digital technologies has followed a consistent and predictable pattern -- the capacity of the technology rises exponentially from one generation to the next, while the cost per unit of capacity declines precipitously. This pattern is well illustrated by the change from analog to digital switching. At the time that telephone companies were first introducing digital switching into the local exchange network, many such companies believed for a variety of reasons that analog switching would continue to prevail for a long time before digital switches would come to predominate: customer premises equipment (CPE) was analog, manufacturing and operational costs for analog switches were lower, features were more robust, and equipment was more reliable.<sup>6/</sup> Each of these points was true at the time. None, except that CPE remains largely analog, has remained true. And even analog CPE presents less of a problem since analog to digital conversion costs have declined and become a minor portion of the overall system costs.<sup>7/</sup>

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<sup>6/</sup> See R. Fike, *Analog or Digital: The Debate Continues*, Telephony, Oct. 17, 1994. (See Appendix A.)

<sup>7/</sup> *Id.*

Another lesson learned from the conversion to digital switching is that the time between generations of the technology is diminishing. The maturation of digital switching technology took less than a decade. Whatever the current status of digital technologies used to deliver video programming, reliable predictions can be made that their capabilities will expand rapidly while their costs decline, leading to widescale deployment. BroadBand Technologies' Fiber Loop Access (FLX) system is concrete evidence that digital technologies that just a few short years ago were thought too expensive or impractical, can now be deployed successfully in the subscriber loop.

A. Regulatory Decisions Recognize the Predominance of Digital Communications Systems

The Commission has repeatedly recognized that the conversion from analog to digital is taking place and has in recent years made several decisions encouraging or even mandating the adoption of digital communications systems. This has been particularly obvious with the adoption of new services, such as direct broadcast satellite (DBS), personal communications services (PCS), and high-definition television (HDTV), where the assumption, as reflected in the technical standards adopted, is that the services will be digital.

The Commission has not limited its support of digital systems to new services; rather, it has in recent years adopted rules or policies that require, or strongly encourage, services to adopt digital technologies. Such examples include the Commission's orders requiring local exchange carriers (LECs) to install facilities for use in providing equal access to

interexchange carriers,<sup>8/</sup> and its 1991 Order specifying a schedule by which the local exchange carriers (LECs) were required to complete Signalling System 7 (SS7) deployment in order to support 800 database applications.<sup>9/</sup> Even the Commission's 1987 decision on digital cellular, while it did not mandate digital systems, clearly indicated that the next generation of cellular would be digital.<sup>10/</sup>

**B. Digital Video Platforms Provide True Video Dialtone and the Backbone for the Information Superhighway**

Even though telephone and cable television companies only now are beginning to deploy digital video platforms, such systems offer many advantages over the more widely available analog video platforms. In the first place, digital video platforms can offer full interactivity, which, depending on the architecture deployed, can include a return path with an initial capacity of as much as 1.6 megabits per second, enough to allow end users to generate and transmit their own video signals. As a result, such digital platforms can support a wide range of applications, including health, education, and other services. Moreover, conditional access capabilities (i.e., the ability to control which signals the

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<sup>8/</sup> Investigation of Access and Divestiture Related Tariffs, Memorandum Opinion and Order, 97 FCC 2d 1082 (1984); 101 FCC 2d 911 (1985), modified, 101 FCC 2d 935 (1985), modified on reconsideration, 102 FCC 2d 503 (1985); Illinois Citizens Utility Board Petition for Rulemaking, 2 FCC Rcd 1726 (1987). ("Equal Access").

<sup>9/</sup> Provision of Access for 800 Service, Notice of Proposed Rulemaking, 102 FCC 2d 1387 (1986); Supplemental Notice of Proposed Rulemaking, 3 FCC Rcd 721 (1987); Report and Order, 4 FCC Rcd 2824 (1989); Memorandum Opinion and Order and Second Supplemental Notice of Proposed Rulemaking, 6 FCC Rcd 5421 (1991). ("800 Database").

<sup>10/</sup> *Liberalization of Technology and Auxiliary Service Offerings in Domestic Public Cellular Radio Telecommunications Services*, Report and Order, 3 FCC Rcd 7033 (1988); Memorandum Opinion and Order, 5 FCC Rcd 1138 (1990).

subscriber will receive) are less costly and complex in a digital environment and eliminate the need for encryption. Finally, after the initial investment, the cost of upgrading analog video systems to provide additional bandwidth or capacity is likely to be greater than for digital systems. LECs that opt for analog video systems today may legitimately be able to argue in the future that it would not be economically reasonable for them to incur the costs of expanding the capacity of such networks.<sup>11/</sup> Such systems are not the advanced broadband that the Commission envisions for the future.

Clearly the Commission must concern itself with issues of transition from analog to digital systems. It is true that the imbedded base of both television receivers and programming content is analog. However, as mentioned earlier, the cost of digital to analog conversion is declining relative to the overall system cost. Digital set-top converters are available commercially for use in receiving DBS services, and the DBS industry projects sales of 600,000 units by the end of 1994. Despite some production delays, television set-top manufacturers remain committed to offering new digital set-tops for wireline video delivery systems in the near future. Moreover, forces are likely to encourage the eventual transition to digital receivers. For example, new video transport systems will be or are digital in format, including HDTV, DBS, and multimedia systems. Furthermore, some manufacturers have already announced their intention to produce television sets that accept

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<sup>11/</sup> Notice, para. 18.

digital input.<sup>12/</sup> An example is TV set manufacturer Thomson/RCA, which is selling digital set-top receivers for DBS services.

Because the world is moving inexorably toward digital technologies, and because digital video platforms can allow LECs to implement video dialtone as the Commission truly envisions, it seems evident that the Commission's video dialtone rules should encourage the adoption of such video platforms. The Commission, however, rightfully concerns itself with issues of cost and availability. In the following section, BroadBand Technologies provides information describing both the cost and functionality of digital video systems that are commercially available today.

### III. Digital Systems are Available Today at Reasonable Prices

In the *Notice*, the Commission noted the potential for digital technologies to overcome the channel capacity limitations and other problems inherent in video dialtone platforms based on analog technologies.<sup>13/</sup> The Commission asked for comments on the "technical, economic, and operational feasibility of digital equipment and facilities" and on whether such technologies will be "commercially available on a broad scale in the near future." The Commission also sought comments on the cost of digital set-tops and the quality of compressed digital video signals.

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<sup>12/</sup> See Appendix A at 3.

<sup>13/</sup> *Notice*, para. 268.

Each component of a digital system must be commercially available at reasonable prices in order for full digital delivery of video dialtone service to become a viable option for local exchange carriers (LECs). From direct experience as a manufacturer of digital video transport systems, BroadBand Technologies can assure the Commission that cost-effective digital transmission technologies are available today for use by LECs in providing video dialtone service. Based on its close involvement with companies developing digital video servers, encoders, and set-tops, BroadBand Technologies also is convinced that these other components are now, or soon will be, available.

A. The Commission Should Encourage the Development of Digital Video Transport Systems

As the manufacturer of an integrated digital video transport system, BroadBand Technologies is uniquely positioned to assure the Commission that digital equipment and facilities for use in delivering video dialtone service are technically, economically, and operationally feasible today. BroadBand Technologies' fully digital first-generation FLX platform, a "cutting edge" technology according to the Commission, is already being deployed. The next generation of the product, which BroadBand Technologies is developing in partnership with AT&T, will be commercially available on a broad scale in the near future, specifically, in late 1995. Consistent with the general trend among digital technologies, the capacity of the FLX system vastly exceeds that of analog transport systems, while the cost has fallen and continues to fall.



As illustrated in Figure 1, the BroadBand Technologies FLX system that Bell Atlantic is deploying in Dover Township, N.J., uses a fiber-to-the-curb (FTTC) architecture and is configured to deliver programming from a video server or other source to a subscriber's set-top.<sup>14/</sup> The programming is switched through a host digital terminal (HDT) located in the telephone company central office and multiplexed with the telephony signal. The combined signal then is transmitted over fiber optic lines to an optical network unit (ONU) located in a curb-side pedestal. At the ONU, the signal is demultiplexed; the telephony signal is transmitted to the home over copper twisted-pair wire and the video is transmitted over coaxial cable drops to the set-top in the subscriber's home. Each HDT serves approximately 300 homes and each ONU serves between 6 and 8 subscribers.

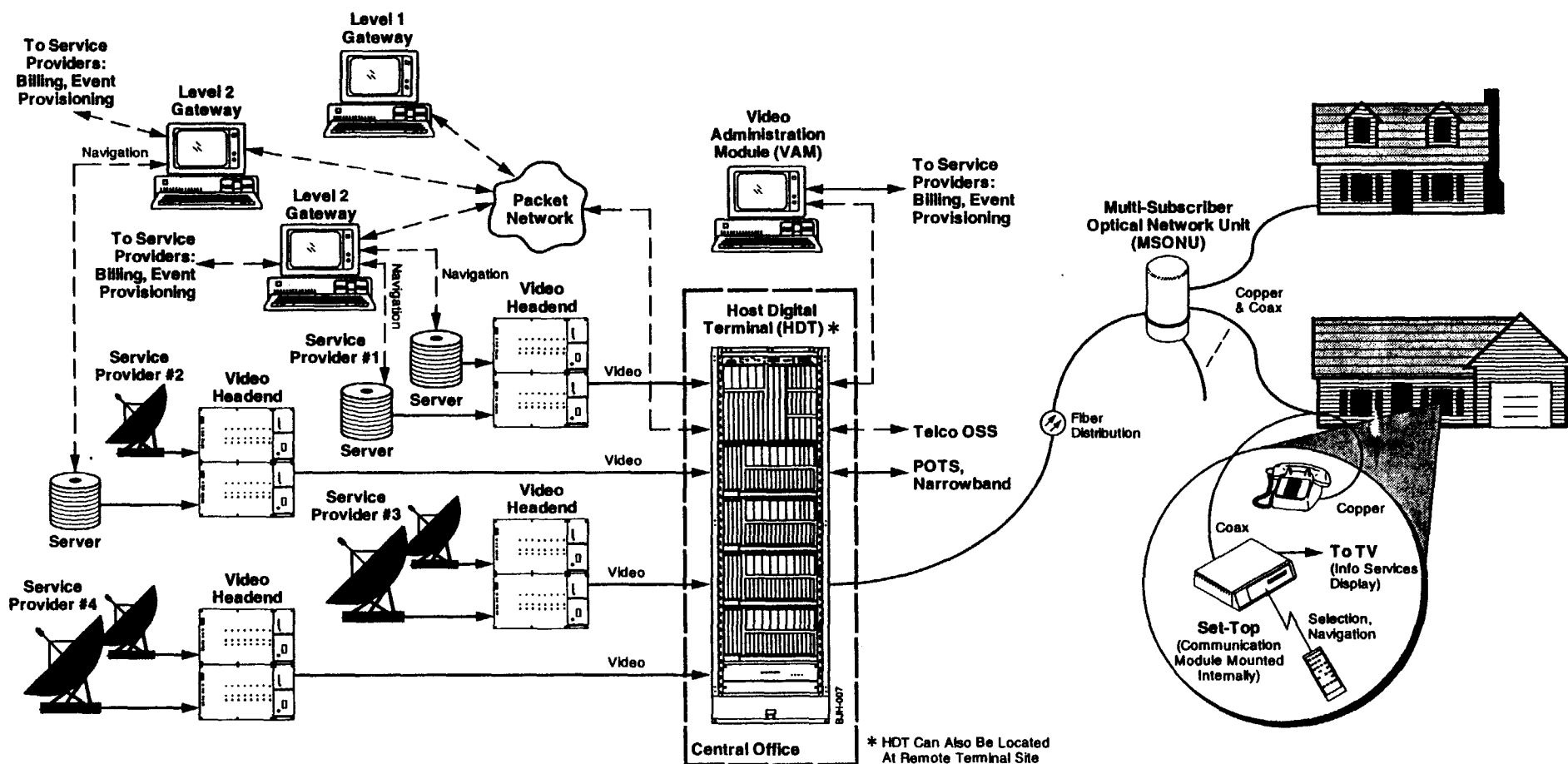
The FLX system is a standards-based platform with a total transmission capacity of 1536 compressed digital video channels per HDT. The platform has been configured to deliver 384 channels of video programming in "broadcast mode," with the remaining channels used to deliver video-on-demand and other interactive video services. The platform complies fully with the Commission's video dialtone rules, including the requirements that the platform provide a two-level gateway structure and sufficient channel capacity to serve multiple programmers on a nondiscriminatory basis. The digital video switching capability of the FLX system ensures that it is expandable to meet additional demand for capacity from customer-programmers, another Commission requirement.

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<sup>14/</sup> BroadBand Technologies intends in the near future to submit an *ex parte* presentation in this proceeding that will include a video tape that demonstrates the FLX system that Bell Atlantic is deploying in Dover Township and has proposed for use in Florham Park, N.J.

FIGURE 1

# Fiber Loop Access (FLX<sup>®</sup>) System



As noted, a second generation of the FLX platform is under development, one which applies the same integrated digital transport approach but modifies the design to provide even greater capacity and allows it to be deployed more economically in locations where low subscriber "take rates" for video dialtone and new broadband interactive services are expected.

In this second-generation design, each HDT serves up to 2500 homes and provides access to a capacity of 2.5 gigabits per second of digital broadband bandwidth. The large amount of available bandwidth ensures that and HDT can support high simultaneous take rates for interactive services among the homes it serves. The system provides for a 1.6 Mbps "upstream" signal from the subscriber's home back to the network, which is sufficient for subscribers to transmit video signals. In contrast, proposed analog video dialtone platforms will support upstream signals equivalent only to 16 kilobits per second. The system also better accommodates the transition from analog to digital technology by allowing its output digital signal to be combined with analog "broadcast" video signals so that both can be simultaneously transported to TV receivers.

1) BroadBand Technologies' Platform Ensures the Commission Goal of Equal Access

The large channel capacity of the FLX system ensures equal access for multiple video programmers, thus eliminating the need for cumbersome channel sharing or channel allocation schemes that may be inconsistent with the common carrier nature of video dialtone

service. No programmer is disadvantaged relative to other programmers. The FLX system allows for substantial control over the network by both the content provider and the subscriber. Indeed, it separates the transport function from the programming content, a marked contrast to the way programming is delivered over analog video delivery systems. In the FLX system, video programmers can determine whether their programming will be delivered in broadcast mode or on an on-demand, *a la carte*, or other basis. Subscribers can control the network in several ways, such as by imposing a "parental lock-out" on certain types of programming, and by ordering programming on an impulse basis. In analog cable TV systems and analog video dialtone platforms, end-user control of channels is much more difficult to implement. It is possible in analog systems to "lock out" only channels, not particular programs. Moreover, true equal access is a problem due to analog systems' inherent channel capacity limitations and channel positioning issues.

## 2) The FLX System is Superior to Alternative Digital Platform Architectures

There are two primary network architectures that can be used to design digital video dialtone platforms. As noted above, the FLX system uses an FTTC architecture and "baseband" modulation, so-called because the system transmits the digital video and telephony signal directly as "bits" through a dedicated (or moderately shared) transmission path to the subscriber. No subcarrier modulation is used. The other type of platform uses a hybrid fiber/coax (HFC) architecture and "passband" modulation -- that is, radio frequency subcarrier modulation is used to transport signals through a shared access transport system. Typically, HFC systems share access using a coaxial cable bus. The FTTC system provides

dedicated connections to overcome the capacity limitations of the shared connections coaxial bus.

As a platform for delivering video dialtone, voice telephony, interactive services, and other offerings on an integrated basis, the baseband FTTC approach is superior to the passband HFC approach in several significant respects.<sup>15/</sup>

- The digital baseband approach is consistent with the overarching trend in telecommunications toward digital transmission. Passband HFC systems are designed primarily to deliver analog video signals, and the primary motivation for deploying such systems is that video programming currently is predominantly analog in format. As digital video programming comes to predominate, there will be greater compatibility between such programming and baseband FTTC systems, in which transmission is all-digital.
- FTTC systems use a "star" topology typical of existing telephone networks and fiber optic lines that extend deep into the network, down to the curbside ONU that serves up to 32 homes. As a result, FTTC systems provide each subscriber a guaranteed slice of the available bandwidth on the network. This allows FTTC systems to support high bit-rate "upstream" channels, extensive broadband interactive services,

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<sup>15/</sup> For a detailed analysis of baseband and passband systems, see Appendix B, J. R. Jones, *Baseband and Passband Transport Systems for Interactive Video Services*, IEEE Communications Magazine, May 1994 at 90.

and high subscriber take-rates for such services. In contrast, in passband HFC systems, fiber optics extend only to a "node" serving about 500 homes; from the node, signals are carried over a coaxial cable "tree and branch" network typical of existing cable TV systems. Because the coaxial portion of the network is shared among many subscribers, the amount of dedicated bandwidth simultaneously available to each subscriber is very limited, particularly in the upstream direction.

Furthermore, because bandwidth must be dedicated for interactive services, passband HFC systems can support only limited-bandwidth interactive services and low take rates for such services before contention or blocking becomes a problem. To reduce contention, network operators could deploy additional HFC fiber nodes, with each node serving fewer subscribers. Such an approach, which would be required to meet rising demand for services in an HFC system, would cause costs to escalate rapidly, raising the total cost of HFC deployment above the cost of the FTTC approach.

- Moreover, the star topology of FTTC systems allows dedicated connections between subscribers and the network, thus eliminating privacy concerns raised by HFC systems. Subscribers on a FTTC system receive only the signals they request, rather than all signals sent to subscribers served by a node, as is the case in an HFC system. FTTC designs do not require the elaborate encryption schemes that HFC approaches require.

- The baseband approach is more compatible with fiber optic transmission media. A fundamental characteristic of optical transmission is its limitation of the carrier-to-noise ratio (CNR) relative to other transmission schemes (such as coaxial cable). The ultimate CNR for optical fiber is 40 decibels less than is achievable in other approaches. Because digital signals require a lower CNR than analog signals, optical fiber is better suited for digital signals than for analog.
- Baseband systems are more compatible with existing in-home wiring than passband systems, which transmit signals above 500 MHz. The wiring in most homes is not designed to carry signals above 500 MHz. Baseband systems transmit signals in the spectrum below 500 MHz. Hence, baseband systems will not require any major rewiring of American homes.
- Passband HFC systems require a modulator to perform subcarrier modulation, whereas baseband systems require no modulation, yielding another cost saving. Moreover, to provide bandwidth efficiency, the HFC approach uses modulators with costly higher-order schemes such as 64 QAM (quadrature amplitude modulation), which raise the cost of providing dedicated bandwidth connections.

### 3) BroadBand Technologies' Digital Architecture is Competitively Priced

For the reasons outlined above, communications network providers have long acknowledged the technological superiority of FTTC baseband systems, such as the FLX platform, particularly their capacity and their ability to support a wide range of services. Until recently, however, such systems have been perceived as too expensive to be used cost-effectively in the subscriber loop.<sup>16/</sup> However, advances in digital technology have reduced the absolute cost of the FLX system and the cost of the system relative to analog and hybrid analog/digital video platforms.

Practical experience with these alternative hybrid analog/digital video dialtone network architectures has convinced many network providers and equipment suppliers of the economic feasibility of digital FTTC systems. Several companies have announced their intention to deploy or support such systems.<sup>17/</sup> In October, U S WEST announced a change in the architecture of its proposed video dialtone systems from hybrid fiber/coax to fiber-to-the-curb. In its news release, it said that the change would result in cost savings.<sup>18/</sup> Furthermore, BroadBand Technologies has formed a partnership with AT&T to develop the

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<sup>16/</sup> D. Reed, *Residential Fiber Optic Networks*. Boston, MA: Artech House, 1991; H. Selander, *The Economics of Fiber to the Subscriber*, Public Utilities Fortnightly, Aug. 16, 1990, p. 24.

<sup>17/</sup> See *Dover Township*, *supra* note 2; Application, New Jersey Bell Telephone Company, W-P-C-6838 (Nov. 16, 1992), Amendment and Clarification, W-P-C-6838 (Sept. 2, 1993, Amendment, W-P-C-6838 (Sept. 13, 1994); U S WEST Investors Report, *Modified Multimedia Network to Deliver More Bang for the Buck*, October 1994; *AT&T Network Systems and Broadband Technologies Announce Enhanced Interactive Video Network System*, news release, Oct. 5, 1994 (Appendix C). ("News Release").

<sup>18/</sup> U S WEST Investors Report, *supra* note 17.



next generation of the FLX system, which will incorporate AT&T's Subscriber Loop Carrier product. In announcing the partnership, an AT&T spokesman stated that "BroadBand Technologies adds a cost-effective, high-performance video capability to our SLC-2000 Access System that will meet the switched digital video requirements that have already been identified by many of our customers."<sup>19/</sup>

As explained above, a principal short-term barrier to widespread deployment of all-digital video dialtone systems is the prevalence of analog television sets that would require digital set-tops to convert digitally transmitted video signals back to analog. The FLX system version BroadBand Technologies will offer in collaboration with AT&T will address this issue. The new product will be capable of delivering analog video channels through the addition of a parallel coaxial network. As mentioned earlier, the digital signal will be combined passively with the analog signals for distribution over the house wiring.

As we note above, BroadBand Technologies is not alone in its conviction that FTTC systems are superior to HFC systems. In fact, at least one other telecommunications equipment manufacturer has committed to manufacturing a baseband FTTC system that will compete with BroadBand Technologies' system. Earlier this year, Fujitsu Network Transmission Systems introduced the "FACTR SONET access platform," which is part of its "Broadway" suite of transmission products.<sup>20/</sup> Notably, a senior official at Fujitsu was

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<sup>19/</sup> News Release, *supra* note 17.

<sup>20/</sup> C. Wilson, *Fujitsu Hits the Boards with Broadway*, *Telephony*, Mar. 14, 1994 at 6.